

U.S. Peach Industry

PART 2. AN INTERREGIONAL COMPETITIVE MODEL FOR CANNED PEACHES



U.S. Department of Agriculture

Economic Research Service

ABSTRACT

Interregional competition in growing and canning peaches is the focus of this second report of a two-part study. Regional production and trade patterns which minimize total costs of producing, processing, transporting, and distributing the national pack of canned peaches are determined under various assumed competitive situations. The United States is divided into eight consumption and four production regions to facilitate this analysis. Particular emphasis is given to the economic potential of the Southeast.

Keywords: Interregional competition, Transportation model, Peaches, Canning, Southeast, West.

PREFACE

There is much interest in the development of agricultural resources to provide expanded employment opportunities in rural areas. Effective development of such resources can help reverse the rural-to-urban migration of recent years and perhaps relieve some of the population pressures on our large metropolitan centers.

This report is part of a continuing program of the U.S. Department of Agriculture to define and appraise the feasibility of rural development opportunities in various regions. It was conducted under a cooperative research program between the Richard B. Russell Agricultural Research Center, Agricultural Research Service, Athens, Ga., and the Economic Research Service, USDA, Washington, D.C.

The report is part II of a two-part study dealing with the economics of the peach industry, with emphasis on peaches for canning. Part I examined the geographic structure of the peach industry and analyzed recent trends in production, utilization, prices, and consumption of peaches for both the fresh and processing markets. Part I also provided the basic structural framework for the interregional competitive model of the peach canning industry used in this second report. Part II determines the regional production and trade patterns that minimize total costs of producing, processing, transporting, and distributing the national pack of canned peaches under various assumed competitive situations.

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SUMMARY

The Southeast could have a competitive advantage over other regions in the production and marketing of canned peaches, according to results obtained using an interregional competitive model. Under the assumption of perfectly elastic supply and a canned cling product comparable in quality to that of the West, the Southeast could provide canned peaches at a lower cost to the majority of U.S. consumers. The potential economic advantage of the Southeast would result from its proximity to large population centers and from lower production costs due to lower land and labor costs.

At present, the West supplies about 90 percent of the Nation's canned peach requirements while the Southeast supplies only 8 percent. Reasons for this pattern include; (1) the large concentration of canning-peach production in the West, while emphasis in other regions has been on production of freestones for the fresh market, and (2) the high quality of the West's canned cling product, generally recognized as having a more desirable texture and appearance than canned freestones. The potential of a Southeast pack comparable to the West's appears realistic because of the interest in expanding production of canning peaches and in planting cling varieties with improved processing characteristics.

The transportation model used in this study determines regional shipments which minimize costs of production, canning, transportation, and distribution incurred in meeting the national demand for canned peaches. Cost data are developed from secondary sources. The four producing centers used in the model are Modesto, Calif.; Spartanburg, S.C.; York, Pa.; and Benton Harbor, Mich. The eight consuming centers are Boston, Mass.; New York, N.Y.; Chicago, Ill.; Minneapolis, Minn.; Atlanta, Ga.; Houston, Tex.; Los Angeles, Calif.; and Seattle, Wash.

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PART 2. AN INTERREGIONAL COMPETITIVE MODEL FOR CANNED PEACHES

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INTRODUCTION

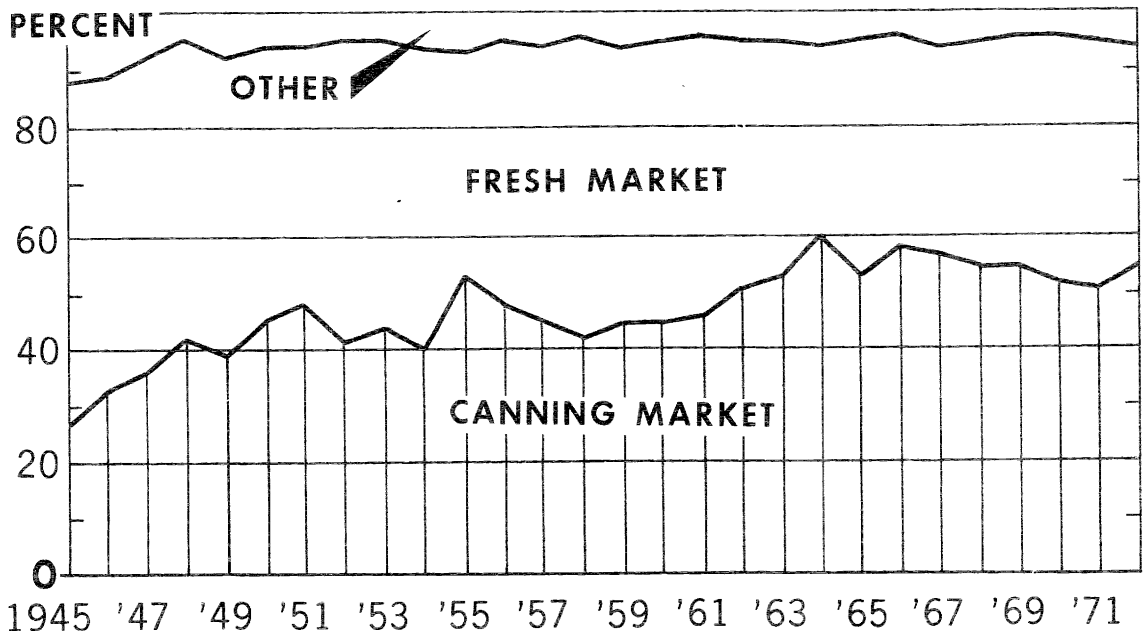
An increasing share of the U.S. peach crop in recent years has been used for canning (fig. 1). In 1972, 54 percent of production went to the canning market, while 40 percent went to the fresh market. The shift from fresh to canning uses reflects the changing pattern of consumer demand for peaches and peach products. The convenience and year-round availability of canned peaches has stimulated a long-term upward trend in per capita consumption, while consumption of fresh peaches has trended downward.

The West is by far the leading producer of peaches for canning, and in recent years has canned over 90 percent of the total peach pack. California dominates in this region. The South is second in importance, but its share of the national pack has remained relatively small.

The South, which produces the major share of peaches for fresh consumption, has been historically geared to the fresh market. Orchards in the South are planted to varieties developed especially for fresh-market use. The processing market has assumed importance in the region only during years of large supplies and depressed prices. However, increased costs of producing and marketing fresh peaches, changing consumer demand for peaches and peach products, and instability in the fresh market are contributing to growing interest among all segments of the industry in developing an expanded processing market.

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PEACH PRODUCTION FOR CANNING AND FRESH MARKETS



SOURCES: (27, 29, 30, 31, 33, 38).

Figure 1

STUDY EXAMINES INTERREGIONAL STRUCTURE

Economic considerations over the long run dictate where peach production can best take place. Future locational developments in the peach processing industry will thus depend on the comparative economic advantage of different regions in producing peaches and processing them into canned and other forms. It is important that the persons involved in directing research on peaches and peach products as well as peach producers and processors interested in expansion opportunities be cognizant of the economic considerations that dictate longrun feasibility of investment in peach processing facilities.

The basic purpose of the two-part study is to quantify economic considerations that influence interregional competition in canning peaches. Specific objectives of the study are:

1. To determine trends and structural characteristics of the supply of and demand for fresh peaches, canned peaches, and other peach products in major producing and consuming regions;
2. To determine the competitive position of the major peach canning regions, with emphasis on the Southeast;

3. To determine the regional production and distribution patterns that minimize total costs of producing, processing, transporting, and distributing the national pack of canned peaches under various assumed competitive conditions; and
4. To provide economic guidelines for future growth of the industry.

Part I examined the geographic structure of the peach industry and analyzed trends in production, utilization, prices, and consumption of both fresh- and processing-market peaches. Interrelationships between fresh-market and processing-market prices in the major producing States were analyzed, and supply response functions for canning-market peaches were developed for each producing region and the United States. The changing pattern of consumer demand for peach products was examined, and regional consumption patterns for canned peach products were projected to 1980.

Part I provided the basic structural framework for the interregional competitive model of the peach canning industry presented here. This model is designed to determine the regional production and trade patterns that minimize total costs of producing, processing, transporting, and distributing the national pack of canned peaches. Measurements are made of each region's present and potential competitive position as it is affected by changes in the supply available for canning in the various producing regions.

No attempt is made in this study to assess alternative uses or optimal use of agricultural resources in the various producing areas. Rather, emphasis is on the potential for expanded production of canning-peach varieties in the Southeast. There appear to be sufficient agricultural resources available in this region to permit substantial expansion of canning-peach production without displacing fresh-market peaches or other crops.

TRANSPORTATION MODEL EMBRACES COMPETITION FACTORS

Since the analytical technique used in this study--a transportation model--has been extensively used in empirical studies of interregional competition, no attempt is made here to examine in detail the theoretical basis for its use. Essentially, the model provides a method of solving for the pattern of shipments from n producing areas to m consuming centers that would satisfy national demand for canned peaches at least cost.

Instead of minimizing only transportation costs, the model can be expanded to include other costs, such as production, processing, and selling costs, which must be considered in pricing the product at its final destination. The costs included in the model for this study are: (1) peach production costs, (2) processing costs, (3) transportation costs, and (4) wholesale and retail distribution costs. Processing and distribution costs were assumed to be the same for each producing or consuming region, so their inclusion in the model does not affect the final solution.

The basic transportation model can be modified in a number of ways to give greater flexibility in studies of interregional competition. In this study, several modifications of the basic transportation model are used, with each modification relating to the supply side of the model. In all cases, the demand for the product for any given year in consuming regions is considered fixed. The two basic modifications are referred to as models I and II.

Model I assumes a perfectly elastic supply for each producing region. This assumption reflects the least-cost distribution pattern in the absence of supply restrictions. It assumes a quantity available in each region sufficient to meet total national demand for canned peaches.

Model II restricts the supply in each producing area to the average production of peaches for canning during 1963-72. The quantity required in each consuming region is the region's 1972 consumption of canned peaches.

In examining the Southeast's potential competitive position, it is assumed that Southeast canned peaches are equal in quality to the canned product from other regions. This assumption is based on the research underway at several agricultural experiment stations in the Southeast and at USDA's Richard B. Russell Agricultural Research Center in Georgia to improve the color and appearance of Southeastern canned peaches. The suitability of newly developed clingstone peach varieties that remain firm through processing has been extensively appraised at these stations. Taste panels at the Georgia Station, basing their evaluation on appearance, aroma, color, texture, and flavor, rated these nonmelting varieties 2/ higher than the Western commercial packs used as controls (1/). 3/ Such findings indicate that use of nonmelting clingstone varieties will enable Southeast canners to pack a product that is comparable in quality to Western canned clings.

Producing and Consuming Regions Identified

Although 35 States report peach production on a commercial basis, production of peaches for canning is concentrated in relatively few States. However, production data are not reported by State but by region. Thus, for this report, production areas were separated into four distinct regions on the basis of availability of data. Production and processing within each region are concentrated to the extent that greater homogeneity exists with respect to physical and economic factors within regions than among regions.

One city in each region was selected to serve as the origin of shipments from that region. Each city is near the center of the greatest concentration of production within the region. The four cities and the States making up each producing region, with principal producing States underscored, are as follows:

2/ Nine varieties of nonmelting clings were compared with three commercial packs. The commercial packs were California grade A canned clings of different leading brands.

3/ Underscored numbers in parentheses refer to items in References at the end of this report.

Producing region

Origin point

Region 1:

California, Colorado, Idaho,
Oregon, Utah, and Washington.....Modesto, Calif.

Region 2:

Delaware, Georgia, Maryland,
North Carolina, South Carolina,
Virginia, and West Virginia.....Spartanburg, S.C.

Region 3:

Connecticut, Massachusetts,
New Hampshire, New Jersey,
New York, Pennsylvania, and
Rhode Island.....York, Pa.

Region 4:

Illinois, Indiana, Kansas,
Michigan, Missouri, and Ohio.....Benton Harbor, Mich.

To represent the demand side of the model, the United States was divided into eight consuming regions on the basis of available population and consumption data. One city in each region was selected as the destination for canned peach shipments. The eight consuming regions and destination points for shipments to each region are as follows:

Consuming region

Destination city

Region 1:

Connecticut, Maine, Massachusetts,
New Hampshire, Rhode Island, and Vermont.....Boston, Mass.

Region 2:

New Jersey, New York, and Pennsylvania.....New York, N.Y.

Region 3:

Illinois, Indiana, Michigan, Ohio,
and Wisconsin.....Chicago, Ill.

Region 4:

Iowa, Kansas, Minnesota, Missouri, Nebraska,
North Dakota, and South Dakota.....Minneapolis, Minn.

Region 5:

Alabama, Delaware, Florida, Georgia,
Kentucky, Maryland, Mississippi,
North Carolina, South Carolina, Tennessee,
Virginia, Washington, D.C., and West
Virginia.....Atlanta, Ga.

Region 6:

Arkansas, Louisiana, Oklahoma,
and Texas.....Houston, Tex.

Region 7:

Arizona, California, Colorado,
Nevada, New Mexico, and Utah.....Los Angeles, Calif.

Region 8:

Idaho, Montana, Oregon, Washington,
and Wyoming.....Seattle, Wash.

Although there are a number of cities in each region that receive canned peach shipments for regional distribution, only one city in each region was chosen to simplify the problem and at the same time give a reasonable representation of the costs of transporting canned peaches from the four producing areas.

Production Costs Estimated

Regional production costs were developed from cost estimates made by various extension services and agricultural economics departments in the production centers of California, South Carolina, Pennsylvania, and Michigan. The California and South Carolina estimates were based on the production of cling peaches for canning. The Pennsylvania and Michigan estimates available from the literature on the peach industry were for unspecified types of peaches for fresh market and were adjusted by the authors to reflect production of peaches for canning. Other revisions were made as needed to achieve completeness and comparability among regions. Most of the revision occurred in certain fixed cost items. For instance, some estimates did not provide for orchard depreciation. Adjustments were made so that in each region orchards were depreciated over the productive life of the trees, and the depreciation allowance was included as an overhead cost. Tree productive life ranged from 8 years in Michigan (17) and Pennsylvania to 10 years in South Carolina (41) to 14 years in California (22). A return to management based on a percentage of sales at historical prices in the area was also included. Since the original estimates were made for different time periods, all data were adjusted to a 1972 basis by applying an index of prices paid by farmers (app. table 4). Tables 1-4 itemize the costs of producing peaches in each of the production centers.

The limitations of this type data in an interregional model should be recognized. Cost data prepared by different individuals may vary because of differences in the original purposes for which the estimates were prepared, differences in the methods used in developing estimates, and differences in individual concepts of costs. The adjusted data used here probably represent the best available and provide a reasonable estimate of the 1972 interregional cost structure. However, there is need for thorough study of the interregional cost structure to update and verify the data used in this analysis.

Table 1--Estimated costs of producing cling peaches in California ^{1/}

Cost item	Costs per acre	
	1969 prices	1972 prices
	<u>Dollars</u>	
Variable costs.....	701.98	820.79
Pruning.....	99.50	116.34
Brush removal.....	7.20	8.42
Fertilization.....	19.50	22.80
Spraying.....	85.01	99.40
Cultivating.....	15.00	17.54
Ridging and knocking.....	4.44	5.19
Irrigation.....	32.55	38.06
Thinning.....	174.40	203.91
Propping and wiring.....	9.85	11.52
Miscellaneous costs.....	7.20	8.42
Harvesting costs.....	247.33	289.19
Fixed costs.....	389.65	455.58
Machinery and building overhead.....	123.94 ^{2/}	144.91
Marketing order.....	36.00	42.09
Orchard depreciation.....	85.71	100.21
Land charge.....	84.00	98.22
Return to management.....	60.00 ^{3/}	70.15
Total costs per acre.....	1,091.63	1,276.37
Total costs per ton.....	68.23	79.77

^{1/} Based on the following assumptions: (1) producing areas of Sacramento and San Joaquin Valley, (2) 109 trees per acre, (3) yield of 16 tons per acre, (4) 100-acre enterprise, (5) land at \$1,200 an acre, and (6) tree productive life of 14 years.

^{2/} Includes taxes (\$44.52), depreciation of buildings and equipment (\$37.31), and office and miscellaneous overhead costs (\$42.11).

^{3/} Five percent of 16 tons at \$75.00 per ton.

Source: Adapted from (22).

Table 2--Estimated costs of producing cling peaches in South Carolina 1/

Cost item	Costs per acre	
	1970 prices	1972 prices
	<u>Dollars</u>	
Variable costs.....	368.99	412.41
Seed.....	2.70	3.02
Fertilizer.....	25.46	28.46
Labor:		
Machine operators.....	18.75	20.96
Seasonal.....	13.00	14.53
Contract piecework.....	142.50	159.26
Tractor operation.....	18.65	20.84
Other machinery operations.....	5.23	5.85
Custom machine operations:		
Pruning.....	41.70	46.61
Thinning.....	30.00	33.53
Spraying.....	66.00	73.76
Irrigation operation.....	5.00	5.59
Fixed costs.....	137.41	153.56
Machinery and building overhead.....	29.78 2/	33.28
Marketing order.....	--	--
Orchard depreciation.....	61.75	69.01
Land charge.....	15.00	16.76
Return to management.....	30.88 3/	34.51
Total costs per acre.....	506.40	565.97
Total costs per ton.....	53.31	59.58

1/ Based on the following assumptions: (1) producing area in Coastal Plain, (2) yield of 9.5 tons per acre, and (3) tree productive life of 10 years.

2/ Includes depreciation, housing, insurance on machinery, taxes, mounting, adjusting, and irrigation overhead.

3/ Five percent of 9.5 tons at \$65.00 per ton.

Source: Adapted from (4).

Table 3--Estimated costs of producing peaches in Pennsylvania ^{1/}

Cost item	Costs per acre	
	1959-63 average prices	1972 prices
	<u>Dollars</u>	
Variable costs.....	195.99	287.36
Orchard protection.....	2.09	3.06
Fertilizer and lime.....	8.34	12.23
Planting and replanting.....	3.01	4.41
Bees--pollination.....	0.28	0.41
Spray materials.....	31.14	45.66
Fuel.....	7.74	11.35
Labor:		
Family.....	17.79	26.08
Hired.....	69.66	102.14
Miscellaneous costs.....	8.71	12.77
Harvesting costs.....	47.23 ^{2/}	69.25
Fixed costs.....	109.41	160.42
Machinery and building overhead.....	42.62 ^{3/}	62.49
Marketing order.....	--	--
Orchard depreciation.....	32.54	47.71
Land charge.....	21.23	31.13
Return to management.....	13.02 ^{4/}	19.09
Total costs per acre.....	305.40	447.78
Total costs per ton.....	71.02	104.13

^{1/} Based on the following assumptions: (1) producing area in Adams and Franklin counties, (2) average peach acreage per grower of 51 acres, (3) yield of 4.3 tons, and (4) tree productive life of 8 years.

^{2/} The yield for bearing acreage (179 bushels per acre) was used rather than the 156 bushels yield for total acreage, and the harvesting cost was revised upward accordingly.

^{3/} Includes license (\$0.56), insurance (\$6.46), depreciation (\$16.22), taxes (\$2.71), and repair to machinery and buildings (\$16.67).

^{4/} Five percent of 4.3 tons at \$60.54 per ton. For 1959-63, growers in Pennsylvania received an average of \$60.54 a ton for freestones for canning (app. table 5).

Source: Adapted from (16).

Table 4--Estimated costs of producing peaches in Michigan 1/

Cost item	Costs per acre	
	1969 prices	1972 prices
	<u>Dollars</u>	
Variable costs.....	359.00	419.75
Pruning.....	66.96	78.29
Brush removal.....	6.01	7.03
Fertilization.....	12.21	14.28
Crop and weed spray.....	18.25	21.34
Spraying.....	57.56	67.30
Hand thinning.....	88.00	102.89
Tying trees.....	3.73	4.36
Tree replacement.....	4.02	4.70
Fall tree care.....	1.60	1.87
Mice control.....	3.00	3.51
Other miscellaneous costs.....	9.66	11.29
Harvesting costs.....	88.00	102.89
Fixed costs.....	180.21	210.70
Machinery and building overhead <u>2/</u>	77.31	90.39
Marketing order.....	--	--
Orchard depreciation.....	43.50	50.86
Land charge.....	42.00	49.11
Return to management.....	17.40 <u>3/</u>	20.34
Total costs per acre.....	539.21	630.45
Total costs per ton.....	112.34	131.34

1/ Based on the following assumptions: (1) producing area is southwestern Michigan, (2) hypothetical 80-acre farm with 20 acres in peaches, (3) yield of 4.8 tons, (4) land at \$700 an acre, and (5) tree productive life of 8 years.

2/ Includes taxes (\$12.00) and fixed costs on machinery and buildings (\$65.31).

3/ Five percent of 4.8 tons at \$72.50 per ton. For 1960-69, growers in Michigan received an average of \$72.50 a ton for freestones for canning (app. table 5).

Source: Adapted from (17).

Processing Costs Similar

For purposes of this analysis, costs of processing canned peaches are assumed to be the same for each producing area. Consequently, their inclusion in the model does not affect the final solution. This assumption is believed to be reasonable in that estimates of processing costs made in 1968 for the West and Southeast were essentially the same (24). Somewhat lower labor costs in the Southeast were offset by economies of scale achieved in the larger west coast operations.

The estimates shown in table 5 include all fixed and variable costs incurred by canners in packing peaches except the cost of the raw product. Material and supply costs include costs of cans, cases, labels, sugar, and other direct supplies. Variable overhead costs cover fuel, power, water, general labor, employee benefits, and royalties. Included in fixed costs are depreciation and financial, administrative, general selling, and indirect labor costs. These estimates were developed from information supplied by the industry.

Table 5--Estimated costs of processing peaches in 1972 1/

Cost item	Dollars per case <u>2/</u>
Variable manufacturing costs.....	3.38
Direct labor.....	0.64
Productive materials and supplies.....	2.31
Variable overhead.....	0.43
Specific selling costs.....	0.44
Freight and delivery.....	0.14
Brokerage, cash discount, and swells.....	0.30
Fixed costs.....	1.46
Total costs per case.....	5.28
Total costs per can.....	0.22

1/ Includes all processing costs except raw product.

2/ 24 #2-1/2 cans.

Transportation Costs Based on Rail Rates

Transportation rates are based on published rail tariffs and represent the lowest rate between origins and destinations (table 6). These rates were supplied by the Traffic Management Branch of USDA's Agricultural Stabilization and Conservation Service.

Wholesale and retail distribution costs were estimated to be about 7 cents per #2-1/2 can. This estimate appears to be consistent with canners' estimates of their distribution costs as well as published material on marketing margins for canned fruits (9, 15, 34, 36).

Table 6--Freight rates on carload shipments of canned peaches, 1972

Destination	Origin							
	Modesto, Calif.		Spartanburg, S.C.		York, Pa.		Benton Harbor, Mich.	
	Cents/ cwt.	can	Cents/ cwt.	can	Cents/ cwt.	can	Cents/ cwt.	can
Boston, Mass.....	238	5.3	106	2.3	66	1.5	113	2.5
New York, N.Y.....	238	5.3	89	2.0	40	0.9	109	2.4
Chicago, Ill.....	192	4.2	86	1.9	99	2.2	27	0.6
Minneapolis, Minn.....	192	4.2	114	2.5	127	2.8	71	1.6
Atlanta, Ga.....	228	5.0	32	0.7	93	2.1	93	2.1
Houston, Tex.....	182	4.0	107	2.4	164	3.6	125	2.8
Los Angeles, Calif.....	44	1.0	228	5.0	238	5.3	226	5.0
Seattle, Wash.....	100	2.2	228	5.0	238	5.3	226	5.0

Note: Case weighs 53 pounds (gross) and contains 24 #2-1/2 cans.

Regional Supply Modified

Two modifications in regional supply have been made. One affects supply price; the other affects the quantity supplied.

The first modification was the use of regional grower prices to compare results with those using the production costs itemized in tables 1-4. Grower prices are expressed in 1972 dollars and based on the average prices paid to growers at the processing plant door during 1963-72. These prices are shown in table 7.

Table 7--Prices paid to growers at processing plant door, 1963-72 average

Production center	Dollars per ton
Modesto, Calif.....	105.33
Spartanburg, S.C.....	85.46
York, Pa.....	99.37
Benton Harbor, Mich.....	101.75

Source: App. table 5, adjusted to 1972 dollars.

The second modification involves only Model II and assumes increased production in the Southeast, while production in the other regions remains unchanged. In effect, the regional supply schedule for the Southeast is shifted to the right. The magnitude of the shift is taken as a threefold increase in production, while the unit supply price remains unchanged.

The assumption of an increased Southeast production was made because of interest in expanding the Southeast's peach canning industry and the research underway that could facilitate such expansion. For example, research efforts to eliminate the problem of peach tree decline or to develop and establish varieties with improved processing characteristics could have a marked effect on the peach canning industry of the region. Within the past few years, 1,000 to 2,000 acres of new cling varieties have been planted in Georgia and South Carolina. Peaches from these plantings were first harvested in 1971, and the small volume packed reportedly has had excellent acceptance by the trade. For purposes of the current analysis, it is assumed that success in these developments could conceivably triple the production of peaches for canning in the Southeast.

Regional Consumption Estimated

Regional consumption requirements for canned peaches have been taken as a fixed quantity in a particular year, having been computed from regional population estimates in conjunction with regional per capita consumption of canned peaches. Estimates of regional consumption in 1972 appear in table 8.

Table 8--Estimated regional consumption of canned peaches, 1972

Consuming center	Consumption
	<u>1,000 cans 1/</u>
Boston, Mass.....	27,369
New York, N.Y.....	85,187
Chicago, Ill.....	129,837
Minneapolis, Minn.....	52,745
Atlanta, Ga.....	115,128
Houston, Tex.....	51,262
Los Angeles, Calif.....	88,720
Seattle, Wash.....	24,029
Total.....	574,277

1/ #2-1/2 can equivalent.

MODELS DETERMINE LEAST-COST DISTRIBUTION PATTERNS

Model I Assumes Elastic Supply

Model I is characterized by a perfectly elastic supply for each producing region--that is, any one origin point could supply the entire Nation's canned peach requirements, providing it could do so at the lowest cost. Optimum distribution patterns for Model I under two assumptions are shown in table 9 and figure 2. The assumptions are: (1) that sample production costs indicate canners' cost of raw product and (2) that grower prices reflect canners' cost of raw product. Also shown in table 9 is the price of canned peaches at each consuming center. This price is the sum of costs itemized in previous sections (raw product cost, processing cost, transportation cost, and distribution cost).

Table 9--Results of analysis based on Model I

Assumption and consuming center	Supplier	Quantity supplied	Price	Total cost
		1,000 cans 1/	Cents/ can	1,000 dollars
Sample production costs:				
Boston, Mass.....	Spartanburg	27,369	36.1	9,880
New York, N.Y.....	do.	85,187	35.8	30,497
Chicago, Ill.....	do.	129,837	35.7	46,352
Minneapolis, Minn.....	do.	52,745	36.3	19,146
Atlanta, Ga.....	do.	115,128	34.5	39,719
Houston, Tex.....	do.	51,262	36.2	18,557
Los Angeles, Calif.....	Modesto	88,720	36.4	32,294
Seattle, Wash.....	do.	24,029	37.6	9,035
Total.....		574,277	35.8	205,480
Grower prices:				
Boston, Mass.....	Spartanburg	27,369	38.2	10,455
New York, N.Y.....	York	85,187	37.9	32,286
Chicago, Ill.....	Benton Harbor	129,837	37.7	48,949
Minneapolis, Minn.....	Spartanburg	52,745	38.4	20,254
Atlanta, Ga.....	do.	115,128	36.6	42,137
Houston, Tex.....	do.	51,262	38.3	19,633
Los Angeles, Calif.....	Modesto	88,720	38.4	34,068
Seattle, Wash.....	do.	24,029	39.6	9,515
Total.....		574,277	37.8	217,298

1/ #2-1/2 can equivalent.

LEAST-COST DISTRIBUTION OF CANNED PEACHES

Based on Model I

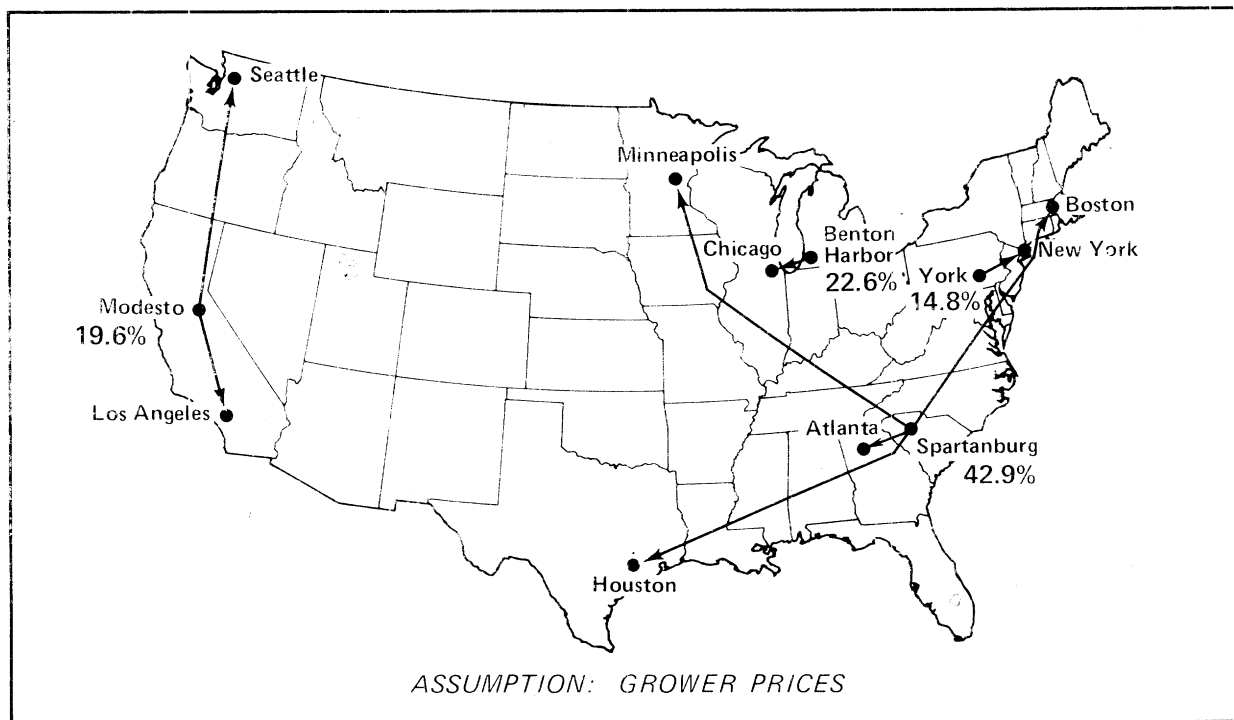
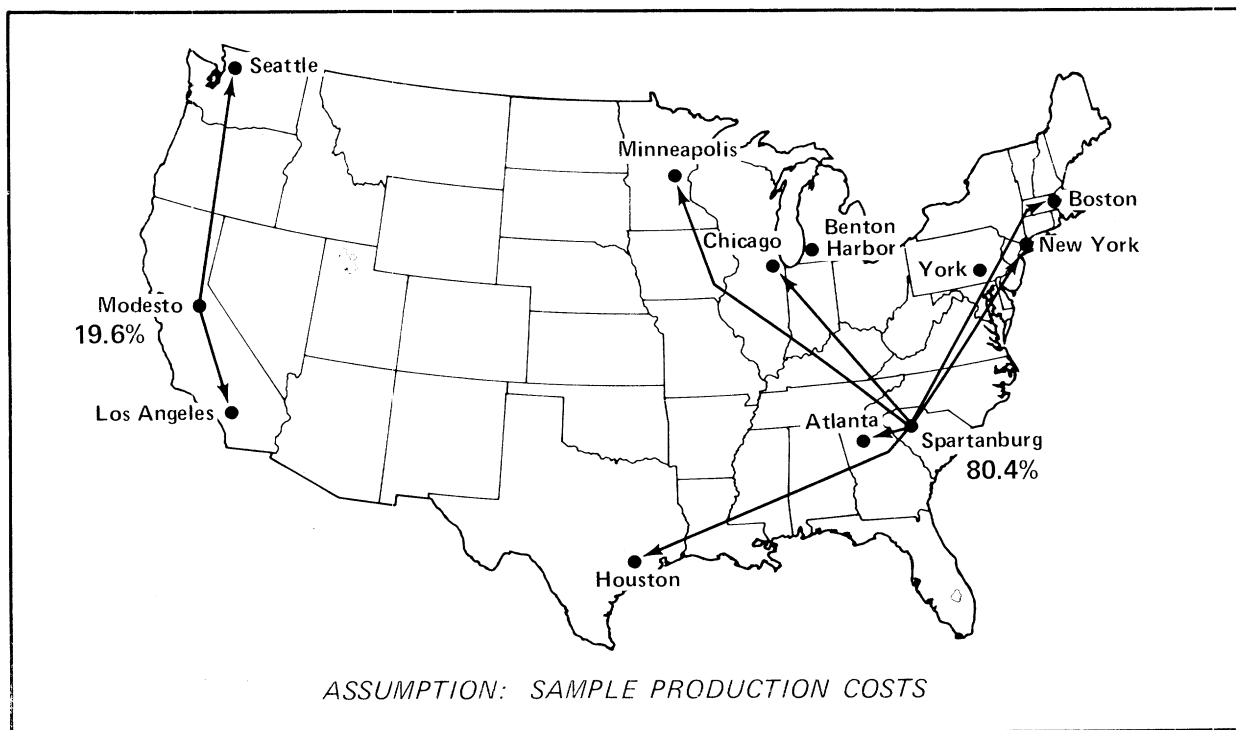


Figure 2

If raw product cost were estimated by using sample production costs, then the least-cost distribution of canned peaches would show Modesto supplying two markets and Los Angeles, Seattle, and Spartanburg supplying the other six markets. Spartanburg would be meeting 80 percent of the national demand for canned peaches. Under these conditions, the bill for providing the national requirements for canned peaches in 1972 would amount to \$205 million.

If canners' raw product cost were estimated by using grower prices, then the New York and Chicago markets would be supplied by York and Benton Harbor, respectively. This results from the improved competitive position of York and Benton Harbor with the use of grower prices. Modesto would meet the demand in Los Angeles and Seattle. Spartanburg would supply 43 percent of the national demand--Boston, Minneapolis, Atlanta, and Houston. Cost of meeting national demand for canned peaches under these conditions would be \$217 million.

Model II Assumes Restricted Supply

Model II is designed to approximate supply and demand conditions that existed in 1972. Each production center for any given year has a finite quantity of canned peaches which can be shipped to consuming centers. To represent this quantity, regional supplies were based on the average production of peaches for canning in the region for the 10-year period 1963-72. The resulting estimated regional supplies were as follows:

	Estimated pack 1,000 cans*
Modesto, Calif.....	983,418
Spartanburg, S.C.....	46,392
York, Pa.....	5,759
Benton Harbor, Mich.....	7,152

*#2-1/2 can equivalent

Source: App. table 7.

The least-cost patterns of shipment obtained using Model II appear in table 10 and figure 3. With the supply restrictions incorporated into Model II, the cost of meeting the Nation's canned peach consumption requirements increases.

If raw product cost were estimated from sample production costs, then Modesto would supply the bulk of consumption needs and ship to all destinations (fig. 3). Spartanburg's entire pack would go to Atlanta and would represent about 8 percent of U.S. demand. York's entire supply would be shipped to New York. Total cost of canned peaches under these assumptions would be \$223 million, compared with \$205 million when there were no restrictions placed on quantity available in a given production center.

If grower prices were used to estimate canners' cost of raw product, the optimum flow of canned peaches from the four origins to the eight destinations would be similar. One exception would be the shipment of Benton Harbor's entire supply to Chicago.

Table 10--Results of analysis based on Model II

Assumption and consuming center	Supplier	Quantity supplied	Price	Total cost
		1,000 cans 1/	Cents/ can	1,000 dollars
Sample production costs:				
Boston, Mass.....	Modesto	27,369	40.7	11,139
New York, N.Y.....	York	5,759	38.2	2,200
New York, N.Y.....	Modesto	79,428	40.7	32,327
Chicago, Ill.....	do.	129,837	39.6	51,415
Minneapolis, Minn.....	do.	52,745	39.6	20,887
Atlanta, Ga.....	Spartanburg	46,392	34.5	16,005
Atlanta, Ga.....	Modesto	68,736	40.4	27,769
Houston, Tex.....	do.	51,262	39.4	20,197
Los Angeles, Calif.....	do.	88,720	36.4	32,294
Seattle, Wash.....	do.	24,029	37.6	9,035
Total.....		574,277	38.9	223,270
Grower prices:				
Boston, Mass.....	Modesto	27,369	42.7	11,687
New York, N.Y.....	York	5,759	37.9	2,183
New York, N.Y.....	Modesto	79,428	42.7	33,916
Chicago, Ill.....	Benton Harbor	7,152	37.7	2,696
Chicago, Ill.....	Modesto	122,685	41.6	51,037
Minneapolis, Minn.....	do.	52,745	41.6	21,942
Atlanta, Ga.....	Spartanburg	46,392	36.6	16,979
Atlanta, Ga.....	Modesto	68,736	42.4	29,144
Houston, Tex.....	do.	51,262	41.4	21,222
Los Angeles, Calif.....	do.	88,720	38.4	34,068
Seattle, Wash.....	do.	24,029	39.6	9,515
Total.....		574,277	40.8	234,390

1/ #2-1/2 can equivalent.

LEAST-COST DISTRIBUTION OF CANNED PEACHES

Based on Model II

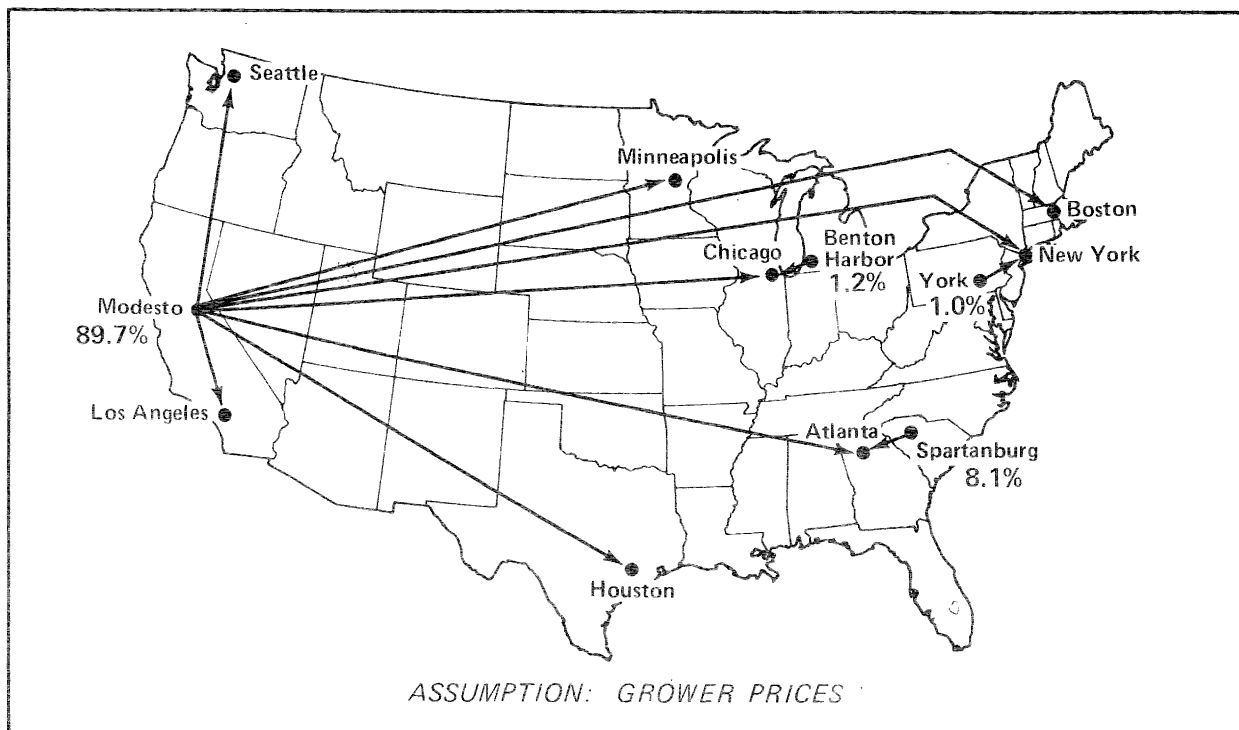
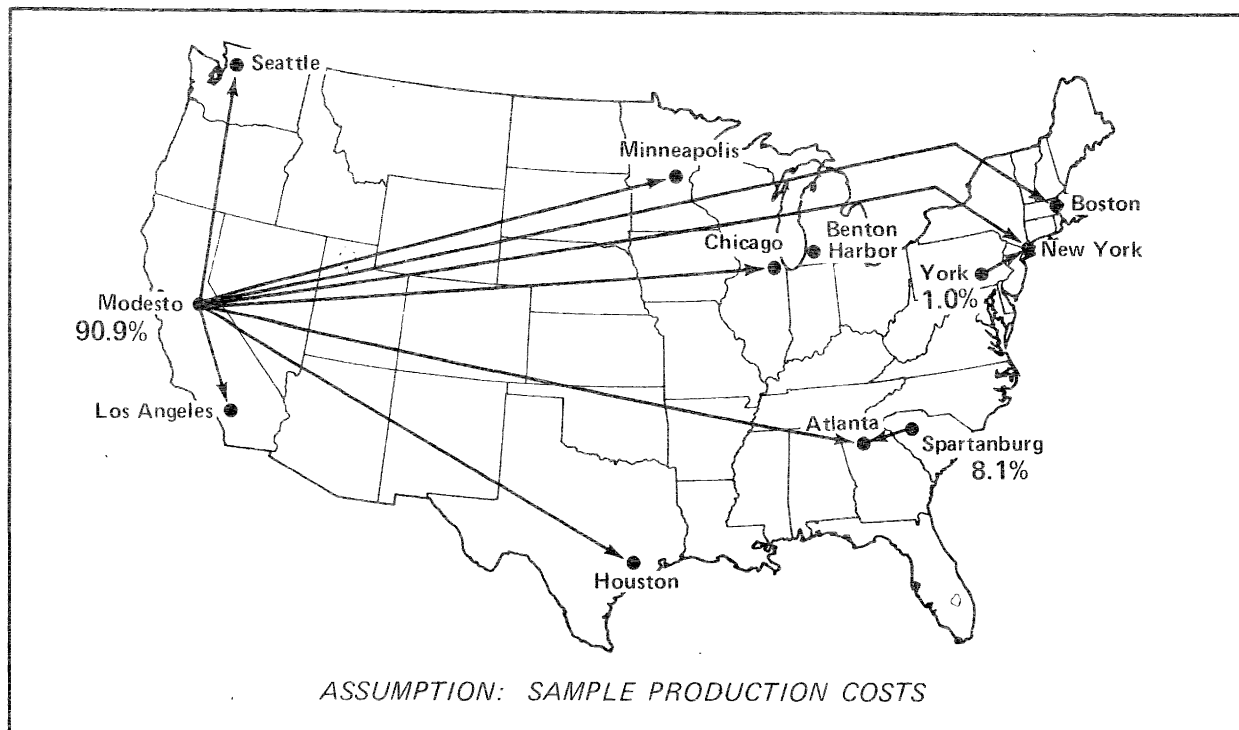


Figure 3

Table 11 and figure 4 show least-cost shipment patterns that occur when regional supply is modified by an assumed tripling of the Southeast pack. Most of the increased supply would be exhausted in meeting Atlanta's consumption needs. Any excess would be shipped to Chicago. If the Southeast pack tripled, Spartanburg's share of the national market would increase to 24 percent and reduce Modesto's market share accordingly. With a tripled Southeast pack, the total cost for the Nation's canned peach consumption could be reduced by \$5 million. Total cost would decrease from \$223 million to \$218 million if sample production costs were used and from \$234 million to \$229 million if grower prices were used.

Table 11--Results of analysis based on tripled pack in the Southeast

Assumption and consuming center	Supplier	Quantity supplied	Price	Total cost
		1,000 cans 1/	Cents/ can	1,000 dollars
Sample production costs:				
Boston, Mass.....	Modesto	27,369	40.7	11,139
New York, N.Y.....	York	5,759	38.2	2,200
New York, N.Y.....	Modesto	79,428	40.7	32,327
Chicago, Ill.....	Spartanburg	24,048	35.7	8,585
Chicago, Ill.....	Modesto	105,789	39.6	41,892
Minneapolis, Minn.....	do.	52,745	39.6	20,887
Atlanta, Ga.....	Spartanburg	115,128	34.5	39,719
Houston, Tex.....	Modesto	51,262	39.4	20,197
Los Angeles, Calif.....	do.	88,720	36.4	32,294
Seattle, Wash.....	do.	24,029	37.6	9,035
Total.....		574,277	38.0	218,276
Grower prices:				
Boston, Mass.....	Modesto	27,369	42.7	11,687
New York, N.Y.....	York	5,759	37.9	2,183
New York, N.Y.....	Modesto	79,428	42.7	33,916
Chicago, Ill.....	Benton Harbor	7,152	37.7	2,696
Chicago, Ill.....	Spartanburg	24,048	37.8	9,090
Chicago, Ill.....	Modesto	98,637	41.6	41,033
Minneapolis, Minn.....	do.	52,745	41.6	21,942
Atlanta, Ga.....	Spartanburg	115,128	36.6	42,137
Houston, Tex.....	Modesto	51,262	41.4	21,222
Los Angeles, Calif.....	do.	88,720	38.4	34,068
Seattle, Wash.....	do.	24,029	39.6	9,515
Total.....		574,277	40.0	229,490

1/ #2-1/2 can equivalent.

LEAST-COST DISTRIBUTION OF CANNED PEACHES

Based on Tripled Pack in Southeast

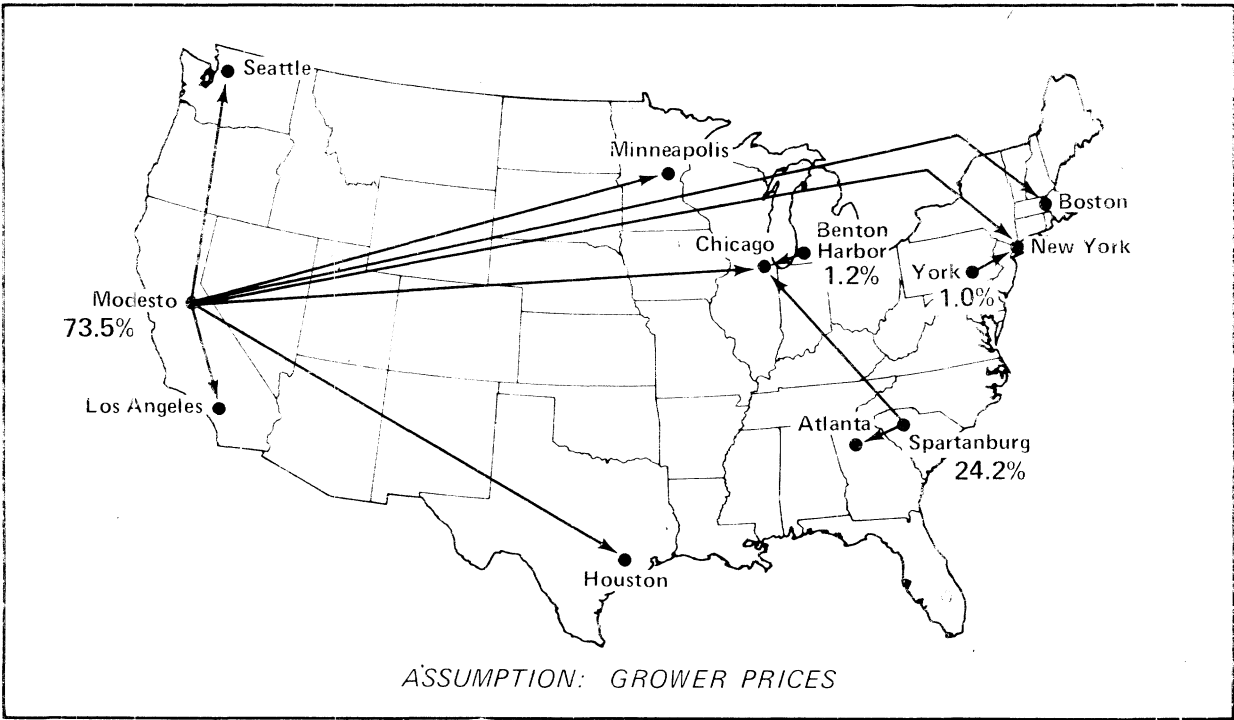
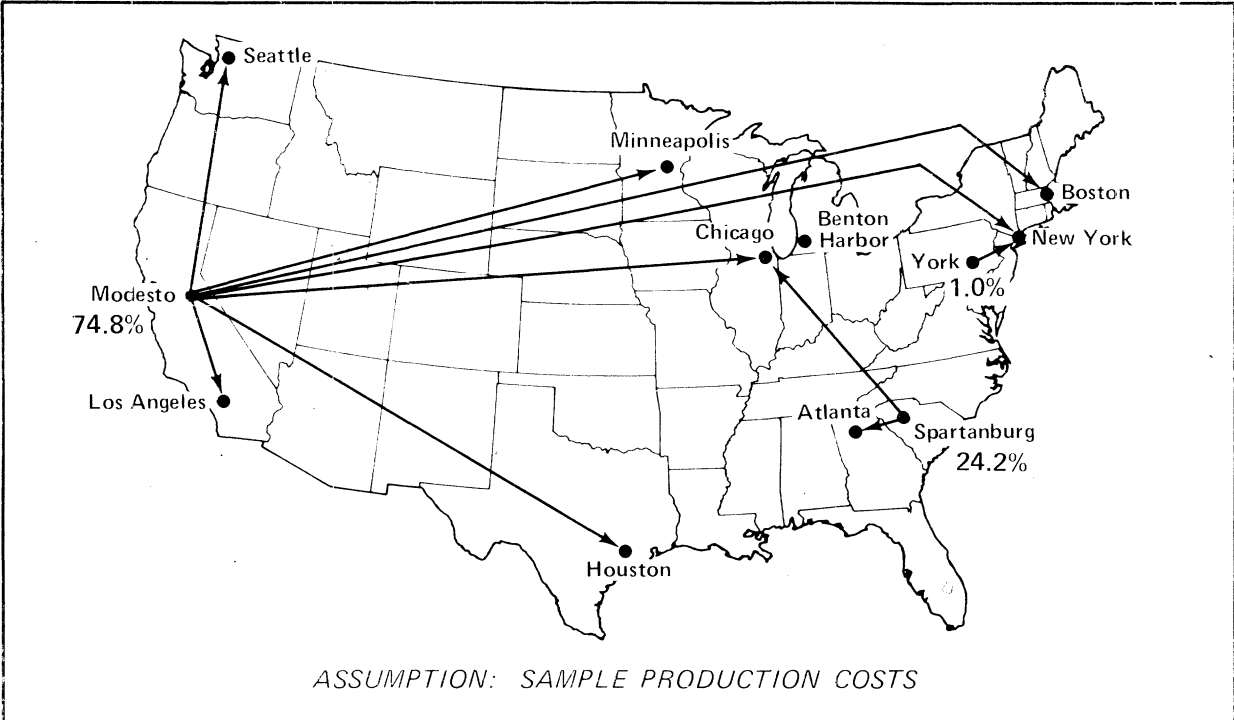


Figure 4

ANALYSIS CONCLUDES POSSIBLE SOUTHEAST ADVANTAGE

The Southeast could have a competitive advantage over other regions in the production and marketing of canned peaches by providing the product at a lower cost to the majority of U.S. consumers. If restrictions on the quantity of canned peaches available in each region were removed, Spartanburg would have a definite economic advantage in six markets: Boston, New York, Chicago, Atlanta, Minneapolis, and Houston (fig. 2). Modesto would have an advantage in two markets--Los Angeles and Seattle.

The Southeast's advantage would result primarily from lower production costs and Spartanburg's proximity to major consuming centers. Available cost studies indicate that the potential production cost advantage is due largely to the differential in land and labor costs. Even with lower yields, this differential would be great enough to keep production costs per ton lower in the Southeast. Southeast canners, who are located closer to large centers of population, could ship their products to more markets at a lower cost. Table 12 compares freight rates on canned peaches for Modesto and Spartanburg canners. Spartanburg could have a sizable freight advantage in 6 of 8 markets studied.

Table 12--Comparison of freight rates on canned peaches between selected origins and destinations, 1972

Destination	Origin		Differential
	Modesto, Calif.	Spartanburg, S.C.	
		<u>Cents/case 1/</u>	
Boston, Mass.....	126	56	70
New York, N.Y.....	126	47	79
Chicago, Ill.....	102	46	56
Minneapolis, Minn.....	102	60	42
Atlanta, Ga.....	121	17	104
Houston, Tex.....	96	57	39
Los Angeles, Calif.....	23	121	-98
Seattle, Wash.....	53	121	-68

1/ Case of 24 #2-1/2 cans.

To profit from a competitive advantage, Southeast canners must have available a continuous supply of peaches suitable for processing. Historically, the peach industry in the South has been oriented toward the higher-priced fresh market, and varieties available for processing have been those that were developed for the fresh market. This situation has contributed to wide year-to-year variation in the canning market's share of the peach crop.

Growing interest in the production of peaches for processing in the Southeast is evidenced by the recent commercial plantings of clingstone varieties with improved processing characteristics. Research that is underway to develop and grow nonmelting peach varieties and to improve production and harvesting efficiencies should serve as the base for an expanded canning industry in the Southeast. Success in these efforts could conceivably lead to a tripling of production for canning. To satisfy the Southeast's consumption requirements, production of peaches for canning must more than double.

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APPENDIX A--SUPPLEMENTAL TABLES

Appendix table 1--Derivation of a weighted season average price for peaches for canning, 1963-72

Crop year	U.S. season average equivalent processing plant door returns received by growers for--		Weighted U.S. average processing plant door returns received by growers for all peaches for canning ^{1/}
	Clingstones for canning	Freestones for canning	
		<u>Dollars per ton</u>	
1963.....	71.70	58.50	68.66
1964.....	76.50	64.30	74.30
1965.....	84.70	56.70	78.54
1966.....	84.70	65.60	81.26
1967.....	98.40	88.80	97.06
1968.....	93.20	87.70	92.21
1969.....	93.50	72.90	90.20
1970.....	99.10	69.30	94.63
1971.....	95.70	73.20	91.88
1972.....	90.30	86.50	89.84

^{1/} Percentage weights were assigned for clingstones and freestones, respectively, as follows: 1963, 77 and 23; 1964, 82 and 18; 1965, 78 and 22; 1966, 82 and 18; 1967, 86 and 14; 1968, 82 and 18; 1969, 84 and 16; 1970, 85 and 15; 1971, 83 and 17; and 1972, 88 and 12.

Sources: (28, 32, 35, 39).

Appendix table 2--Canning-market season average price and fresh-market season average price for peaches, 1963-72

Crop year	U.S. season average price received by growers	
	Peaches for canning <u>1/</u>	Peaches for fresh consumption <u>2/</u>
	<u>Dollars per ton</u>	
1963.....	68.66	112.40
1964.....	74.30	126.80
1965.....	78.54	111.20
1966.....	81.26	147.00
1967.....	97.06	179.40
1968.....	92.21	135.00
1969.....	90.20	134.00
1970.....	94.63	168.00
1971.....	91.88	168.60
1972.....	89.84	228.00

1/ Taken from app. table 1.

2/ Sources: (28, 32, 35, 39).

Appendix table 3--Price indices

Year	Consumer price	Wholesale price	Wholesale price
	index for all items	index for farm products	index for processed foods and feeds
	<u>1967 = 100</u>		
1963.....	91.7	96.0	92.5
1964.....	92.9	94.6	92.3
1965.....	94.5	98.7	95.5
1966.....	97.2	105.9	101.2
1967.....	100.0	100.0	100.0
1968.....	104.2	102.5	102.2
1969.....	109.8	109.1	107.3
1970.....	116.3	111.0	112.0
1971.....	121.3	112.9	114.3
1972.....	125.3	125.0	120.8

Source: (6).

Appendix table 4--Index of prices paid by farmers, 1960-72

Year	Production, interest, taxes, and wage rates
	(1910-14 = 100)
1959.....	305
1960.....	307
1961.....	311
1962.....	316
1963.....	322
1964.....	322
1965.....	333
1966.....	347
1967.....	356
1968.....	370
1969.....	390
1970.....	408
1971.....	430
1972.....	456

Source: (37).

Appendix table 5--Season average equivalent processing plant door returns received by growers for peaches for canning, 1959-72

Year	Clingstone, Calif.	Freestone				
		U.S.	Calif.	S.C. 1/	Pa.	Mich.
Dollars per ton						
1959.....	58.70	46.40	44.00	52.00	56.70	52.00
1960.....	55.90	45.60	40.10	52.00	60.00	57.50
1961.....	67.50	43.60	40.20	47.00	56.00	54.50
1962.....	64.10	43.20	40.20	46.40	56.70	60.00
1963.....	71.70	58.50	58.80	53.90	73.30	74.00
1964.....	76.50	64.30	64.10	83.30	74.60	60.00
1965.....	84.70	56.70	55.20	58.40	65.40	69.00
1966.....	84.70	65.60	66.70	64.10	77.90	82.00
1967.....	98.40	88.80	88.60	75.20	112.00	123.00
1968.....	93.20	87.70	97.40	72.00	77.10	2/
1969.....	93.50	72.90	75.30	70.00	75.20	2/
1970.....	99.10	69.30	68.50	70.00	82.00	2/
1971.....	95.70	73.20	68.90	79.40	89.80	2/
1972.....	90.30	86.50	86.30	96.00	113.00	97.00

^{1/} Includes returns received by growers for peaches for freezing.

^{2/} Not published to avoid disclosing individual operations.

Sources: (28, 32, 35, 39).

Appendix table 6--Resident population of consumption regions, 1972

Area	Population
	<u>Thousands</u>
Consumption region 1.....	12,099
Maine.....	1,029
New Hampshire.....	771
Vermont.....	462
Massachusetts.....	5,787
Rhode Island.....	968
Connecticut.....	3,082
Consumption region 2.....	37,659
New York.....	18,366
New Jersey.....	7,367
Pennsylvania.....	11,926
Consumption region 3.....	40,927
Ohio.....	10,783
Indiana.....	5,291
Michigan.....	9,082
Illinois.....	11,251
Wisconsin.....	4,520
Consumption region 4.....	16,626
Minnesota.....	3,896
North Dakota.....	632
South Dakota.....	679
Iowa.....	2,883
Missouri.....	4,753
Nebraska.....	1,525
Kansas.....	2,258
Consumption region 5.....	44,875
Delaware.....	565
Maryland.....	4,056
Washington, D.C.....	748
Virginia.....	4,764
West Virginia.....	1,781
North Carolina.....	5,214
South Carolina.....	2,665
Georgia.....	4,720
Florida.....	7,259
Kentucky.....	3,299
Tennessee.....	4,031
Alabama.....	3,510
Mississippi.....	2,263

Continued

Appendix table 6--Resident population of consumption regions, 1972--Continued

Area	Population
	<u>Thousands</u>
Consumption region 6.....	19,981
Arkansas.....	1,978
Louisiana.....	3,720
Oklahoma.....	2,634
Texas.....	11,649
Consumption region 7.....	27,488
Colorado.....	2,357
New Mexico.....	1,065
Arizona.....	1,945
Utah.....	1,126
Nevada.....	527
California.....	20,468
Consumption region 8.....	7,445
Montana.....	719
Idaho.....	756
Wyoming.....	345
Washington.....	3,443
Oregon.....	2,182

Source: (40).

Appendix table 7--Utilization of peach production for canning, 1963-72

Crop year	U.S. production for canning	Production center			
		Modesto, Calif.	Spartanburg, S.C.	York, Pa.	Benton Harbor, Mich.
		<u>Million pounds</u>			
1963.....	1,784.4	1,657.0	105.6	8.4	13.4
1964.....	1,939.6	1,893.7	11.4	15.4	19.1
1965.....	1,648.2	1,511.9	110.3	10.2	15.8
1966.....	1,828.8	1,733.8	82.1	4.9	8.0
1967.....	1,413.4	1,382.9	22.4	2.3	5.8
1968.....	1,874.6	1,727.2	132.2	9.7	5.5
1969.....	1,873.5	1,751.4	96.2	10.4	15.5
1970.....	1,471.2	1,392.6	60.8	10.5	7.3
1971.....	1,392.8	1,291.4	66.4	12.3	22.7
1972.....	1,249.6	1,196.4	46.0	7.2	1/

1/ Not published to avoid disclosing individual operations.

Sources: (26, 27, 30, 31, 33, 38).

APPENDIX B--CONVERSION FACTORS

To convert bushels of peaches into pounds, an equivalent of 48 pounds to the bushel was used. The publication "Conversion Factors and Weights and Measures for Agricultural Commodities and their Products" (25) gives the weight as 46 to 52 pounds. The factor of 48 was chosen because Agricultural Statistics (29) had used it and because 48 represents neither extreme.

The following equations were used for converting processed peaches into farm weight: farm weight = .873 times canned weight; farm weight = 1.25 times frozen weight; and farm weight = 6.94 times dried weight (25).

All other factors used in this report are shown in appendix table 8.

Appendix table 8--Factors relating to selected canned fruits

Commodity	Pounds net weight of standard case 24 #2-1/2's	Pounds farm weight	
		From cases 24 #2-1/2's	From can #2-1/2
Peaches.....	43.5	37.98	1.58
Clingstone.....	43.5	36.36	1.51
Freestone.....	43.5	44.44	1.85
Fruits for salad.....	45.0	40.00	1.67
Fruit cocktail.....	45.0	40.00	1.67

Source: (7).